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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/628,803	07/28/2003	Sung Hoon Lee	29936/39432	4537

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EXAMINER	
VINH, LAN	

ART UNIT	PAPER NUMBER
1765	

DATE MAILED: 05/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/628,803	LEE, SUNG HOON	
	Examiner	Art Unit	
	Lan Vinh	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 10/628,803.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *010605*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hong (US 5,903,040) in view of Kirchhoff (US 6,673,693)

Hong discloses a method for forming trench isolation. The method comprising the steps of:

sequentially forming a pad oxide film and a pad nitride film on a silicon substrate (col 3, lines 42-44)

patterning the nitride layer to expose a portion of the substrate (col 3, lines 43-44; fig. 1) which reads on forming a photoresist pattern through which an isolation region is opened, on the pad nitride film

etching the pad nitride film and the pad oxide film using a patterned etching mask, thus exposing the silicon substrate of the isolation region (col 3, lines 45-47)

performing an electrochemical etch using an HF solution in the silicon substrate of the exposed isolation region (col 32-34)

removing the mask/photoresist pattern (col 5, lines 45-46)

performing a thermal oxidization process to the substrate thereby forming an oxide film in the isolation region (col 4, lines 48-50)

Unlike the instant claimed invention as per claim 1, Hong fails to specifically disclose performing an electrochemical etch using an HF solution to form porous silicon in the silicon substrate and performing a thermal oxidization process to oxidize the porous silicon

Kirchhoff discloses a method for forming a trench in a semiconductor substrate comprises the step of performing an electrochemical etch using an HF solution to form porous silicon in the silicon substrate and performing a thermal oxidization process to form oxide (col 3, lines 9-19)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Hong method by performing an electrochemical etch using an HF solution to form porous silicon in the silicon substrate and performing a thermal oxidization process to oxidize the porous silicon as per Kirchhoff because Kirchhoff discloses that the porous substrate is advantageously oxidized into porous substrate oxide thereby enabling the use of further etchant that are suitable for removing substrate oxide (col 2, lines 35-39)

3. Claims 2-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hong (US 5,903,040) in view of Kirchhoff (US 6,673,693) and further in view of Bassous et al (US 5,501,787)

Hong as modified by Kirchhoff has been described above. Unlike the instant claimed invention as per claims 2-7, Hong and Kirchhoff fail to disclose performing the electrochemical using a silicon dissociation reaction in a work cell that is designed to apply a voltage (1.5-8 V) to the back of the silicon substrate to be used as a work electrode, in which a countepart electrode (Pt) and a reference electrode are designed so that they are immersed into an electrolyte with them kept at a given distance and an ultraviolet ray source for illuminating ultraviolet rays to the work electrode is installed on the top electrode wherein the electrolyte employs a solution where HF and ethanol are mixed

Bassous discloses a method for making porous silicon comprises the step of electrochemical using a silicon dissociation reaction in a work cell that is designed to apply a voltage (1.5 V) (fig. 8) to the back of the silicon substrate to be used as a work electrode, in which a countepart electrode (Pt) and a reference electrode are designed so that they are immersed into an electrolyte with them kept at a given distance and an ultraviolet ray source for illuminating ultraviolet rays to the work electrode is installed on the top electrode wherein the electrolyte employs a solution where HF and ethanol are mixed (col 3, lines 29-35; col 4, lines 45-60; col 5, lines 46-50; col 7, lines 33-35)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Hong and Kirchhoff by performing the electrochemical as per

Bassous because Bassous discloses that his electrochemical etching referred as immersion scanning produces porous silicon in a fast, reliable and selective manner on substrate of any size and geometry (col 1, lines 54-62)

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hong (US 5,903,040) in view of Kirchhoff (US 6,673,693) and further in view of Gartner et al (US 6,528,433)

Hong as modified by Kirchhoff has been described above. Unlike the instant claimed invention as per claim 8, Hong and Kirchhoff fail to disclose implementing the thermal oxidation process using a wet oxidization at a temperature of 700-900^0 C under oxygen and hydrogen atmosphere

Gartner discloses a method for monitoring nitrogen processes in semiconductor manufacturing comprises the step of performing a thermal oxidation process using a wet oxidization at a temperature of 900^0 C under oxygen and hydrogen atmosphere (col 3, lines 36-45)

Thus, one skilled in the art at the time the invention was made would have found it obvious to modify Hong and Kirchhoff by performing a thermal oxidation process as taught by Gartner because Gartner discloses that it is especially preferred that if the oxide is fabricated through as wet oxide through thermal oxidation at 900^0 C (col 2, lines 40-46)

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LV
April 28, 2005